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| Kathy Manke<br>Avago Technologies Limited<br>4380 Ziegler Road<br>Fort Collins, CO 80525 |             |                      | EXAMINER<br>MOON, SEOKYUN       |                             |
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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* KEN A. NISHIMURA, CHARLES D. HOKE and  
THOMAS A. KNOTTS

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Appeal 2009-013924  
Application 10/771,738  
Technology Center 2600

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Before SALLY C. MEDLEY, KRISTEN L. DROESCH and  
GREGORY J. GONSALVES, *Administrative Patent Judges*.

DROESCH, *Administrative Patent Judge*.

DECISION ON APPEAL

## STATEMENT OF THE CASE

Avago Technologies ECBU IP (Singapore) Pte. Ltd. (“Avago”), the real party in interest, seeks review under 35 U.S.C. § 134(a) of a Final Rejection of claims 1-4, 7-8, 10-14 and 16-24<sup>1</sup>. We AFFIRM-IN-PART.

## BACKGROUND

Avago’s invention is related to driving electro-optical display devices such as liquid crystal displays (LCDs). Spec. p. 2, ll. 4-5; p. 4, ll. 2-11; p. 19, ll. 1-4.

Claim 1 is representative:

A drive circuit for driving a display device comprising electro-optical material disposed between a common electrode and an array of pixel electrodes, said drive circuit comprising:  
pixel drive circuits connected to respective ones of the pixel electrodes and operable to generate respective pixel drive signals alternating between a first high voltage and a first low voltage differing in voltage by less than or equal to a process-limited maximum; and  
a common drive circuit connected to the common electrode and operable to generate a common drive signal alternating between a second high voltage and a second low voltage differing in voltage by more than the process-limited maximum, the common drive signal being asymmetrically bipolar with respect to the first low voltage.

The Examiner relies on the following prior art:

|           |              |               |
|-----------|--------------|---------------|
| Kitajima  | 6,064,358    | May 16, 2000  |
| Kawaguchi | 6,667,925 B1 | Jan. 13, 2004 |

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<sup>1</sup> Claim 6 was objected to as including allowable subject matter.

Claims 1-4, 7, 10, 13, 14, 16-19 and 21 are rejected under 35 U.S.C. § 102(b) as anticipated by Kitajima.

Claims 8, 11, 20 and 22 are rejected under 35 U.S.C. § 103(a) as unpatentable over Kitajima.

Claims 12, 23 and 24 are rejected under 35 U.S.C. § 103(a) as unpatentable over Kitajima and Kawaguchi.

### ISSUES

1. Did the Examiner incorrectly find that Kitajima describes a process-limited maximum?
2. Did the Examiner incorrectly find that Kitajima describes a threshold voltage at which an electro-optical response is produced by the electro-optical material?
3. Did the Examiner incorrectly find that Kitajima describes a process-limited maximum that is less than or equal to 1.8 volts?

### FINDINGS OF FACT (“FF”)

#### Kitajima

1. Kitajima describes, referring to Figure 11 below [numbers from Figure 11 inserted], a liquid crystal panel including a backlight [64], transparent substrate [56], display electrode [54], liquid crystal [57], common electrode [63], transparent substrate [58] and a thin film transistor [102] to drive the display electrode [54] comprising a drain electrode [102A], a source electrode [102B], a gate electrode [102C], and a semiconductor layer [102D]. Col. 5, ll. 26-32; col. 6, ll. 52-62; col. 7, ll. 3-5, 26-35.

Kitajima's Figure 11 is below:

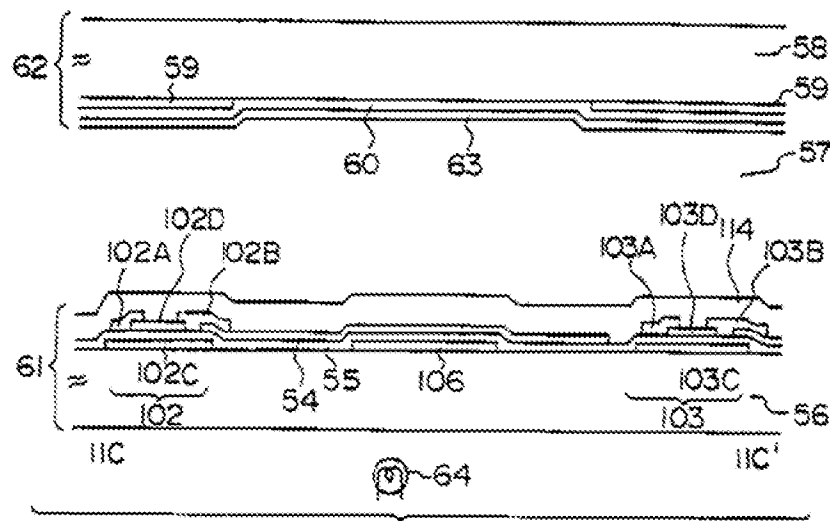


Figure 11 depicts a cross section of the liquid crystal display panel.

2. The semiconductor layer of the transistor is formed of an amorphous silicon film or multi-layered silicon film having a thickness of about 180 nm. Col. 9, ll. 45-48.

3. The semiconductor layers are preferably an a-Si type thin film transistor and a p-Si type thin film transistor. Col. 6, ll. 58-60.

4. A voltage is kept between the transparent pixel electrodes of the pixels formed on the lower transparent substrate and the common transparent electrodes formed on the upper transparent substrate and applied to the liquid crystal sealed between the upper and lower substrates. Col. 12, l. 66-col. 13, l. 5.

5. The voltage changes the molecular orientation of the liquid crystal and changes the light transmittance of the light applied from the backlight source which results in realizing the display. Col. 13, ll. 3-8.

6. The liquid crystal serves to control the quantity of light applied from the backlight source depending on the voltage difference between the display electrode and common electrode. Col. 5, ll. 40-43.

7. Kitajima describes, referring to Figure 26 below [numbers from Figure 26 inserted], the waveforms of the driving voltages applied to the gate electrode (a), the drain electrode (i.e., signal line) (b), the common electrode line (c), and the relative relation among the waveforms and the waveform of the voltage applied to the source electrode (d). Col. 17, ll. 36-44.

Kitajima's Figure 26 is below:

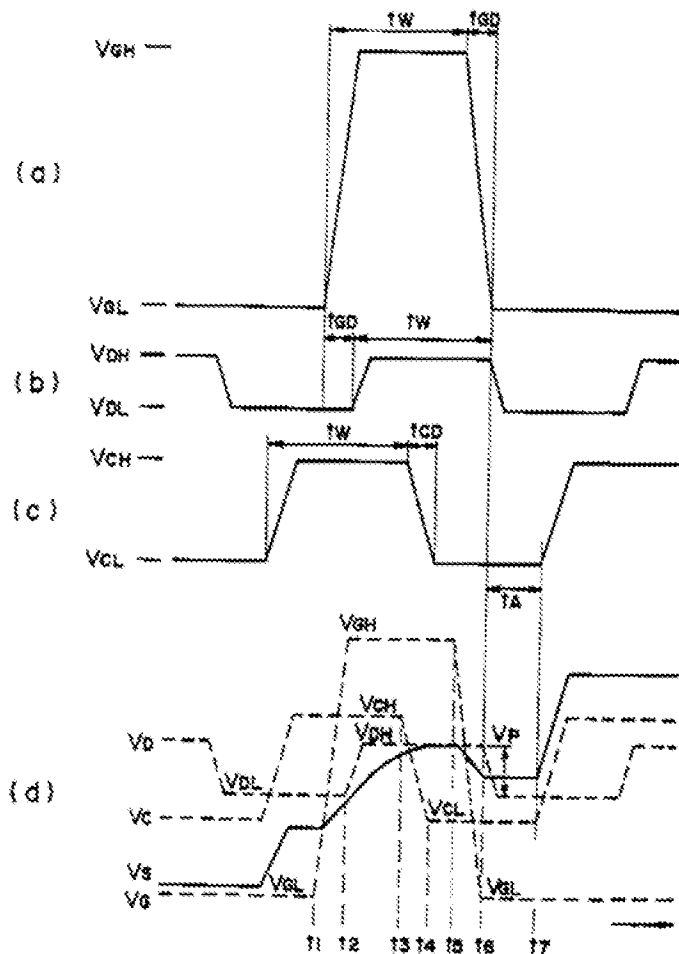


Figure 26 depicts the waveforms of the driving voltages

8. The voltage difference applied to the liquid crystal is defined depending on the potential difference between the signal line and the common electrode line. Col. 18, ll. 64-66.

9. A desired voltage VDH-VCL is applied to the liquid crystal element at a time t5. Col. 17, ll. 62-64.

#### ANALYSIS

##### Claims 1, 4, 7, 8, 10-14, 17 and 19-24

Avago disputes the meaning given to the term “process-limited maximum” of independent claims 1 and 17. The Examiner finds that Kitajima’s description of a high voltage VDH applied to the drain electrode is a “process-limited maximum”. Ans. 3, 8; citing col. 1, ll. 10-13, col. 15, ll. 43-46, Figs. 1, 11, 26; *see* FFs 1, 7, 9. The Examiner explains that it would be reasonable for one with ordinary skill in the art to interpret the term as any maximum value during any process since it is not a defined term in the art. Ans. 8. Avago argues that “process-limited” refers to modern integrated circuit processes; not a signal driving process. Br. 9, citing Spec. p. 3, ll. 4-10.

We decline Avago’s invitation to narrowly construe “process-limited maximum” to have a meaning based on its disclosure of modern integrated circuit processes because limitations should not be read into the claims from the specification. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993). During prosecution, claim terms are given “the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification.” *In re Morris*, 127 F.3d 1048,

1054 (Fed. Cir. 1997). The meaning given to a “process-limited maximum” is reasonable and Avago does not direct us to an explicit definition for “process-limited maximum” in its Specification.

The Examiner also finds that even if a “process-limited maximum” is narrowly interpreted to mean a “breakdown voltage” consistent with Avago’s disclosure<sup>2</sup>, Kitajima still teaches the disputed claim limitation. Ans. 8. The Examiner finds that the driving voltage in Kitajima must be less than or equal to the breakdown voltage of the pixel drive circuits because if the pixel drive circuits are driven with a voltage greater than the breakdown voltage, the circuits would be broken down. Ans. 8. Avago does not offer a reply to sufficiently explain the error in the Examiner’s findings.

For all these reasons, we sustain the rejection of claims 1 and 17 as anticipated by Kitajima. Avago does not separately argue the limitations of dependent claims 4, 7, 8, 10-14<sup>3</sup> and 19-24. Br. 15-22. For the same reasons, we sustain the rejections of: (1) claims 4, 7, 10, 13, 14, 19 and 21 as anticipated by Kitajima; (2) claims 8, 11, 20 and 22 as obvious over Kitajima; and (3) claims 12, 23 and 24 as obvious over Kitajima and Kawaguchi.

#### Claims 2, 3 and 18

Claims 2 and 18 depend from independent claims 1 and 17 and each recite: “the first low voltage and the second low voltage differ in voltage by less than or equal to a threshold voltage at which an electro-optical response

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<sup>2</sup> Dependent claim 13 also recites: “the process-limited maximum is the breakdown voltage of said pixel drive circuits.”

<sup>3</sup> Claim 13 is grouped together with claim 16 but the arguments do not substantively address the limitations of claim 13.

is produced by the electro-optical material.” Avago disputes the Examiner’s finding that Kitajima inherently teaches that the first low voltage VDL and the second low voltage VCL differ by less than or equal to a threshold voltage (i.e.,  $VDH-VCL$ ) at which an electro-optical response is produced by the electro-optical material. Ans. 3-4, citing col. 17, ll. 62-64; FF 9. The Examiner explains that if the voltage difference is greater than the threshold voltage (i.e.,  $VDH-VCL$ ), the liquid crystals in the pixels of the display would be controlled by the voltage difference and the liquid crystals of the display would not control the transmission of the back light at the right timing. Ans. 3.

Avago argues that Kitajima does not teach or suggest that the voltage difference  $VDL-VCL$  is related to a threshold voltage at which an electro-optical response is produced by an electro-optical material. Br. 11. Avago argues that it is not inherent that the voltage difference (i.e.,  $VDL-VCL$ ) must be less than or equal to the threshold voltage. Br. 12-13. Avago argues that instead the liquid crystals included in the pixels of the display *may* be controlled by the voltage difference and retain control of the transmission of the back light with correct timing. Br. 13.

The Examiner’s findings are unsupported by Kitajima’s description. Kitajima describes that a voltage is kept between the transparent pixel electrodes of the pixels formed on the lower transparent substrate and the common transparent electrodes formed on the upper transparent substrate and applied to the liquid crystal sealed between the upper and the lower substrates. Col. 12, l. 66-col. 13, l. 5; FF 4. The voltage changes the molecular orientation of the liquid crystal and changes the light transmittance of the light applied from the backlight source which results in

realizing the display. Col. 13, ll. 3-8; FF 5. The liquid crystal serves to control the quantity of light applied from the backlight source depending on the voltage difference between the display electrode and common electrode. Col. 5, ll. 40-43; FF 6. Kitajima also describes that a desired voltage  $VDH-VCL$  is applied to the liquid crystal element at a time  $t_5$  shown in Figure 26. Col. 17, 62-64; FF 9. The Examiner does not direct us to, and we cannot find, where Kitajima describes that the desired voltage  $VDH-VCL$  is a threshold at which an electro-optical response or an operational electro-optical response is produced by the liquid crystal. Nor does the Examiner direct us to where Kitajima describes that at voltages greater than the desired voltage  $VDH-VCL$ , the liquid crystal would be controlled by the voltage difference and the liquid crystal would not control the transmission of the back light. The Examiner does not sufficiently explain why the liquid crystals would necessarily be controlled at voltages greater than the desired voltage  $VDH-VCL$  and would not necessarily control the transmission of the backlight at voltages above the desired voltage  $VDH-VCL$ . Based on the record before us, it is unclear whether this is necessarily the case. It may be possible that at voltages greater than this desired voltage  $VDH-VCL$  the liquid crystals could be controlled by the voltage difference and yet could still control the transmission of the backlight to some extent. “‘The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient [to establish inherency]’”. *In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993) (quoting *In re Oelrich*, 666 F.2d 578, 581-582 (CCPA 1981).

For all these reasons, we do not sustain the rejection of claims 2, 3 and 18 as anticipated by Kitajima.

Claim 16

Claim 16 ultimately depends from claim 1 and recites: “the process-limited maximum is less than or equal to 1.8 volts.” The Examiner finds that Kitajima inherently teaches the disputed limitations since the 180 nm transistors in Kitajima’s pixel drive circuits have a breakdown voltage of less than 1.8 volts and because it is necessary to set the drive signals at a voltage less than the breakdown voltage to prevent breakdown of the drive circuit. Ans. 4.

Earlier in prosecution, Avago argued that it was incorrect to conclude that a 180 nm transistor would have a breakdown voltage of 1.8 volts because the breakdown voltage of a transistor is a function of more than just the thickness of the insulator. Ans. 11. The Examiner explains that other factors may lower the breakdown voltage but would not make the breakdown voltage any greater than 1.8 volts. Ans. 11.

The Examiner’s findings are unsupported by a sufficient factual basis. Kitajima describes that the semiconductor layer of the transistor is formed of an amorphous silicon film or multi-layered silicon film having a thickness of about 180 nm. Col. 9, ll. 45-48; FF 2. Kitajima also describes that the semiconductor layers are preferably an a-Si type thin film transistor and a p-Si type thin film transistor. Col. 6, ll. 58-60; FF 3. The Examiner does not sufficiently explain why a 180 nm thick transistor would necessarily have a breakdown voltage of 1.8 volts or why the breakdown voltage would only be reduced by other factors. The breakdown voltage of a semiconductor device is dependent upon many factors including the particular semiconductor material utilized (e.g., silicon, SiC, SiN) which can be varied by way of different treatments such as doping. In particular, the

Examiner does not sufficiently explain why Kitajima's amorphous silicon film, multi-layered silicon film, a-Si type thin film, or p-Si type thin film having a thickness of about 180 nm would necessarily have a breakdown voltage equal to or less than 1.8 volts.

For all these reasons, we do not sustain the rejection of claim 16 as anticipated by Kitajima.

#### DECISION

We AFFIRM the rejection of claims 1, 4, 7, 10, 13, 14, 17, 19 and 21 under 35 U.S.C. § 102(b) as anticipated by Kitajima.

We REVERSE the rejection of claims 2, 3, 16 and 18 as anticipated by Kitajima.

We AFFIRM the rejection of 8, 11, 20 and 22 under 35 U.S.C. § 103(a) as unpatentable over Kitajima.

We AFFIRM the rejection of claims 12, 23 and 24 under 35 U.S.C. § 103(a) as unpatentable over Kitajima and Kawaguchi.

#### TIME PERIOD

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

#### AFFIRMED-IN-PART

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